

REMARKS

Claims 1, 4 to 8, and 11 to 22 are now pending in the present application.

In view of the following, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

Applicants respectfully request that the Examiner acknowledge acceptance of the Drawings and the claims for foreign priority.

With respect to paragraph two of the Office Action, claim 14 was rejected under 35 U.S.C. § 112 because it is assertedly a duplicate of claim 1.

While the rejection may not be agreed with, to facilitate matters, claim 1, as presented, has been rewritten to provide that *the firing is performed so that the first metal is diffused with the second metal.* This requirement is not recited in claim 11 (which claim 14 depends from). It is therefore respectfully requested that the rejection be withdrawn.

Claims 15, 16, 19, and 20 were rejected under 35 U.S.C. § 112 as to the definiteness requirement.

As to the Office Action's comments regarding the term "palladium" appearing to be a typographical error, claims 15, 16, 19, and 20 have been corrected as to the spelling of that term. As to the term phrase "relatively low", claims 15, 16, 19, and 20 no longer contain the descriptive term "*relatively low*", and simply provide that *silver-palladium (AgPd) or gold (Au), is fired at a temperature that is below the melting point of the metallization pastes.* It is therefore respectfully requested that the indefiniteness rejections be withdrawn.

Claims 1, 4 to 8, 11 to 22 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 6,406,939 ("Lin" reference) in view of U.S. Patent Application 2003/0080392 ("Zuniga-Ortiz" reference) and U.S. Patent 6,372,539 ("Bayan" reference).

To reject a claim under 35 U.S.C. § 103(a), the Office bears the initial burden of presenting a *prima facie* case of obviousness. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish *prima facie* obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This

teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

Also, as clearly indicated by the Supreme Court in *KSR*, it is “important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements” in the manner claimed. *See KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007). In this regard, the Supreme Court further noted that “rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.*, at 1396. Second, there must be a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim features. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974).

Although the rejections may not be agreed with, to facilitate matters, claim 1, as presented, is to a *method for producing a conductive layered coating on an insulating substrate, comprising: equipping, in selected regions, at least one surface of an electrically insulating substrate with a coating of an electrically highly conductive first metal, the coating being structured as conductor paths; cleaning the at least one coated surface; seeding the coating with seeds of a second metal; depositing a layer including an alloy of the second metal onto the coating seeded with the seeds of the second metal; firing the substrate deposited with the layer of the second metal to form the conductive layered coating, the firing being performed so that the first metal is diffused with the second metal; and contacting a gold bonding wire to the conductive layered coating, wherein: the substrate includes a low-temperature co-fired ceramic (LTCC), the first metal includes silver, and the second metal includes palladium.*

In particular, claim 1 provides that the first metal and second metal are diffused through firing. The Lin, Zuniga-Ortiz and Bayan references do not disclose the diffusion of two metals through firing, as provided for in the context of the claimed subject matter.

The Office Action asserts that in Lin, chips having silver pads may also be used according to the related art. Additionally, it is asserted that palladium is named as a possible coating material for the inner walls of the through-hole of the ceramic. Furthermore, it is asserted that starting from these considerations and the method of Lin, a first coating (electroless depositing) of the inner walls of the through-hole of the ceramic would take place using the palladium, and that a second coating for the contacting of the silver pad of the chip would take place using Ni-P or Cu.

A difference may already be seen in the fact that according to the presently claimed subject matter, only one coating is provided -- namely, the depositing of palladium on silver. Additionally, a layer construction deviating from the presently claimed subject matter would also result. In accordance with the Lin method, the silver pad would not be directly connected to the palladium, but would have an additional intermediate layer of Ni-P or Cu.

Furthermore, the Office Action asserts that the ceramic named as a substrate in Lin could also be designed as LTCC through a related art that is mentioned in the application. According to the Office Action, it is to be inferred from this that the ceramic provided in Lin could also have a metal film made out of silver. Even if this were so (which is not conceded), one skilled in the art does not arrive at the presently claimed subject matter. Even if a coating of the silver (first metal) with palladium (second metal) did occur, a subsequent firing would not occur -- as required according to the claimed subject matter, so as to form an intermetallic connection of the silver and the palladium.

The Office Action explains that in the field of circuit trace technology the connecting of components through a burning is common. However, one skilled in the art would only consider Lin if he were seeking a design approach for the contacting of a chip on a substrate. In this context, Lin concerns an electrical and mechanical connection between the chip and the substrate. Even if an LCTT substrate having silver was provided and the inner walls of the through-holes of the substrate are coated, one skilled in the art would not use an additional costly firing process, since the desired result of an optimal contacting may already be achieved without such a firing process.

Since the Lin reference provides no indications that the contacting may be improved by a firing, for example, one skilled in the art would not be motivated to modify the Lin reference, based on the other references.

Even if, contrary to expectations, one skilled in the art would consider a firing, he would eventually learn that after the burning process, an intermetallic connection would be obtained between the silver of the LTCC substrate and the palladium deposited on the silver. Since it is also always to be assumed that one skilled in the art is motivated to act efficiently, one skilled in the art would decide to revert right back to an LTCC having an AgPd coating. In this manner, the need for both the palladium-coating process and the firing process would be eliminated. Thus, one skilled in the art would not arrive at the method according to the presently claimed subject matter.

The claimed subject matter is also allowable for the following further reasons:

If it is assumed that with the knowledge of Lin that, the use of an already known LTCC substrate could be considered by one skilled in the art, it is then also generally known how a feedthrough normally takes place in an LTCC substrate. First through-holes are punched in the substrate or pierced using a laser. Subsequently, the through-holes are filled in using a conductive paste to obtain the feedthrough. Then, chips on the underside of the LTCC substrate may be contacted in a simple manner. In contrast to this, Lin illustrates a design approach that is significantly more costly for one skilled in the art, for arriving at the same result – namely, the contacting of a chip on a ceramic substrate. For this reason, one skilled in the art would not consider Lin, as asserted in the Office Action.

Ultimately, the presently claimed subject matter concerns the obtaining of an LTCC substrate having a usable assembly surface (for ICs or capacitors, for example). Also, LTCC substrates having a printed circuit trace of Ag are not suitable for such an assembly (Ag circuit traces corrode). Even if a circuit trace of AgPd could indeed be printed, it would not survive the subsequent sinter process (adhesion problems).

The presently claimed subject matter thus provides a novel approach for obtaining a usable assembly surface without an additional post-fire printing process. This is achieved in that Ag is used as a printed circuit trace for the LTCC substrate. Using only a galvanic process (seeding and coating of the Ag circuit traces with palladium) and subsequently burning at high temperatures, one obtains an intermetallic connection (AgPd) from this Ag circuit trace. This AgPd circuit trace then provides a bondable and adhesive surface that may be used for the later assembly steps. These facts do not follow from any of the applied references, whether taken alone or combined.

Also, the Office Action conclusorily asserts that the Lin reference teaches a “method for producing a conductive coating on a *dielectric* (i.e. insulating) substrate”, but it is respectfully submitted that the Office Action mistakenly uses the terms dielectric and insulating substrate interchangeably. The term *dielectric* is actually restricted to instances in where *alternating* electric fields are presently acting on the substance. In contrast, an *insulator* describes metal that is being withheld to *high* electric fields. Insulators and dielectrics actually have different physical properties. In particular, *insulators do not allow current flow because of the presence of large energy band gap, whereas dielectrics do allow some current flow because their energy band gap is smaller than that of insulators.*

Still further, the Lin reference makes plain that item 401 refers to an *integrated circuit chip itself and not specifically to an electrically insulating substrate*, and item 402 refers to *terminal pads, whose composition is not suggested or disclosed*.

As to the Lin text at col. 6, lines 50-55, the cited text merely refers to a method in which an integrated circuit chip is immersed in a electroless plating bath – and therefore does not disclose (or even suggest) a method for *seeding the coating of metal with seeds of a second metal*, as provided for in the context of the claimed subject matter. The Zuniga-Ortiz and Bayan references are also silent on the process of *seeding*. The Office Action also admits that the Lin reference does not disclose that the substrate is subject to firing, and relies on Official Notice.

As further regards all of the obviousness rejections, any Official Notice is respectfully traversed to the extent that it is maintained and it is requested that the Examiner provide specific evidence to establish those assertions and/or contentions that may be supported by that Official Notices under 37 C.F.R. § 1.104(d)(2) or otherwise. In particular, it is respectfully requested that the Examiner provide an affidavit and/or that the Examiner provide published information concerning these assertions. This is because the § 103 rejections are apparently being based on assertions that draw on facts within the personal knowledge of the Examiner, since no support was provided for these otherwise conclusory and unsupported assertions. (See also MPEP § 2144.03).

Accordingly, claim 1 is allowable, as are its dependent claims 4 to 8 and 19 to 22.

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Claim 11 includes features like those of claim 1, as presented, and is therefore allowable for essentially the same reasons, as are its dependent claims 9, 10, 12 to 18.

Accordingly, claims 1, 4 to 8 and 11 to 22 are allowable.

CONCLUSION

In view of the above, it is respectfully submitted that all of the presently pending claims 1, 4 to 8 and 11 to 22 are allowable. It is therefore respectfully requested that the rejections (and any objections) be withdrawn. Since all issues raised by the Examiner have been addressed, an early and favorable action on the merits is respectfully requested.

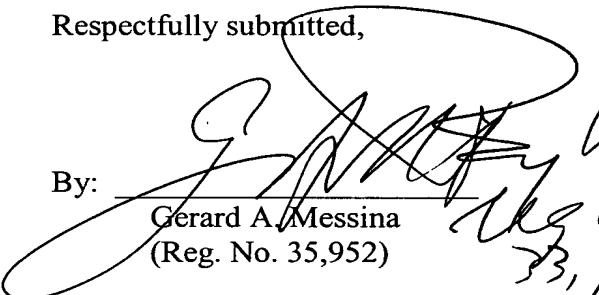
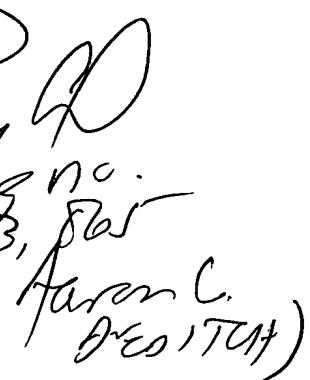
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